Heifer Reproduction
A Challenge with a Payback

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"Reproduction is a Luxury Function"

- Priority to become pregnant lies below maintenance & growth
- Heifers fortunately lack stress levels of lactating cattle

Heifer Repro Physiology

- Onset of puberty at 40% of mature BW 550-600# for Holsteins
- 5-12% anestrus at 12 months of age
- 16 hour/day lighting trial saw the onset of puberty one month earlier
- 2006 USDA study – no heat stress impacts
- No metabolic or calving insults

Cow Physiology

- Loss of progesterone into milk or from accelerated liver function after calving
- High BUN's (>19) appear to be detrimental to fertility in some situations

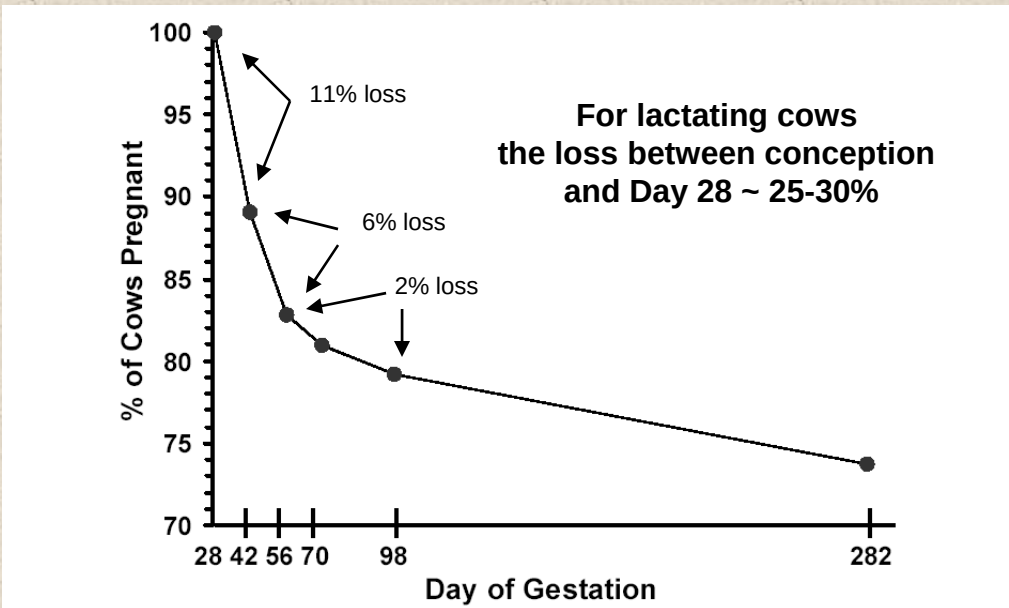


Figure 1. Pregnancy loss in lactating Holstein cows assessed using transrectal ultrasonography from Day 28 post breeding to calving. Total loss from Day 28 of gestation to calving was 24.7%. (Adapted from Vasconcelos et al., 1997)

Not apparent pattern in heifers

What's Normal Cow Fertility?

- Fertilization rates for normal heifers and lactating cows are between 90-92% when insemination timing is correct
- Lactating cows lose about 40% of fertilized "pregnancies" by day 42
- If HDR is 100%, both pregnancy and conception rate would average 52%
- Pregnancy loss for heifers is assumed to be better; data is not readily available

Conception Rates

- 2007 NYS all lactating average = 39%
- Range is from 45% for the best 1st lactation performance to 25% for the poorest old cows
- 2006 USDA study of 362,000 heifers averaged 57%; others note 65%
- Using a 65% CR and 92% fertilization rate suggests early pregnancy loss up to 42 DCC at least 27% for heifers!

Ron Butler, Cornell

What's the important number?

- Pregnancy rate! – the speed at which they get bred
- 55%+ is a level to shoot for
- True PR will be 2-4% below the calculated

examples

80% HDR X 70% CR = 56% PR

or

90% HDR X 60% CR = 54% PR

Management Challenge

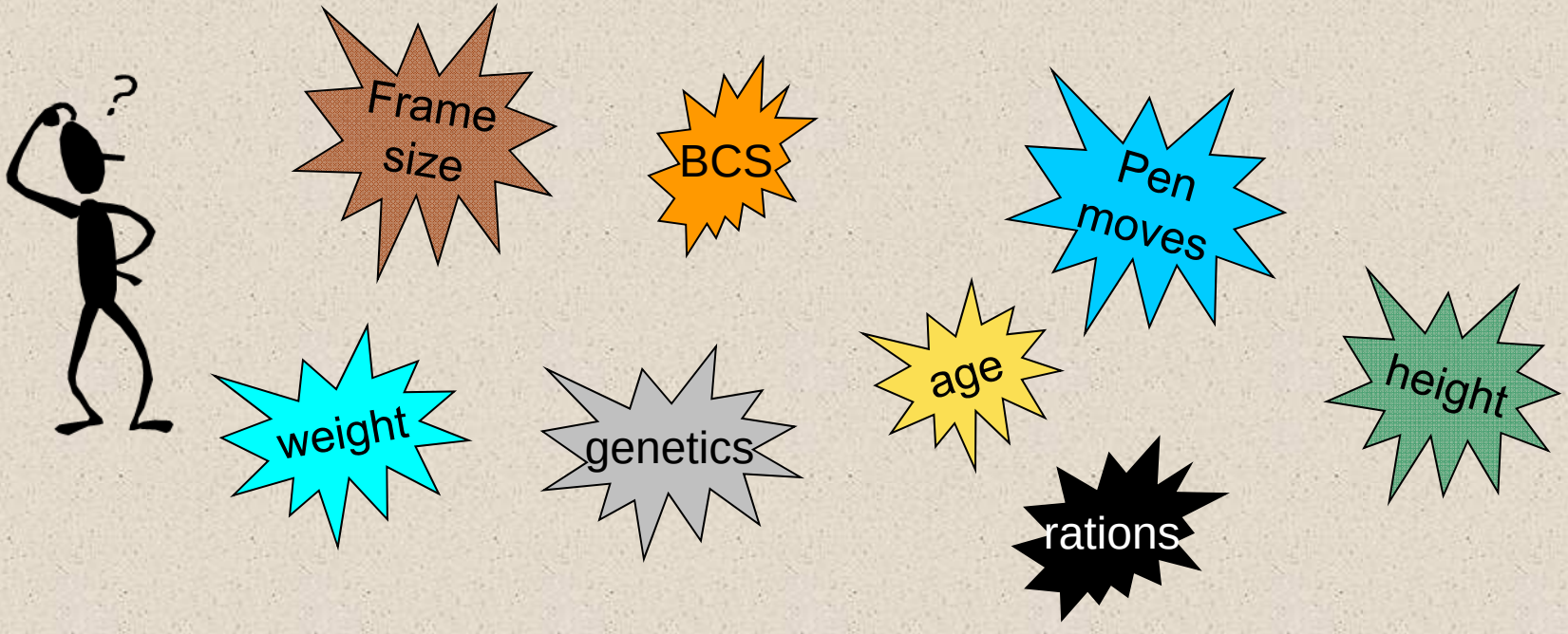
- Heifers often out of the visual "flight path" on the farm
- Facilities often not conduce for observing, handling, sorting, catching, marking, vaccinating, monitoring
- Overcrowding, footing and ventilation common

Management Challenge

- Heifers do not have routine disruptions like milking that cluster estrus behavior
- 2X daily heat detection is necessary for results
- Tank to heifer semen time may be an issue leading to fertility problems

Fine Tuning and Balancing

How do we hit management targets when we have such biological variation?



Measure, Monitor and Analyze

Breeding Targets

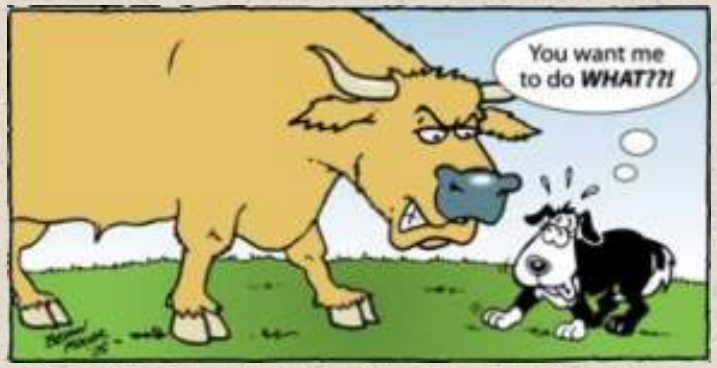
BREED	HIP HEIGHT (inches)	WEIGHT (pounds)	HEART GIRTH (inches)	BODY CONDITION
Holstein & Brown Swiss	49”-51”	750#-800#	64”-66”	3.0-3.25
Ayrshire & Guersey	47”-49”	650#-700#	61”-63”	3.0-3.25
Jersey	43”-45”	550#-600#	58”-60”	3.0-3.25

The above targets are more important than age. Insemination at less than 12 months of age is generally avoided. Individual growth patterns within breed will vary by genetics, nutrition and health experience.

"So what's the matter with using a good bred bull?"

- No proof of genetic transmitting ability
- No rating of calving ease
- One-third have compromised fertility

- Few pre-breeding exams are ever done on dairy herd bulls
- Venereal diseases possible
- Can be dangerous



"So what's the matter with using a good bred bull?"

- Inaccurate breeding dates
- Pre-calving vaccination program hard to maintain
- Difficult to evaluate breeding program
- Bull interactions in large groups lessens effectiveness (?)

Disease Issues

- Leptospira species – late abortions, stillborns, weak newborns
- *Lepto hardjo bovis* – implantation failure, EED (up to 45 DCC?)
- *Neospora caninum* - 5-6 mo abortions (early loss past 45 DCC?), newborn neurological issues
- *Salmonella dublin* - *abortions*
- IBR – abortion storms past 4 months
- BVD – infertility, EED, abortion, deformities, persistent infections in calves

Nutrition

- Balanced for growth targets including the micros!
- Fat heifers are prone to infertility and calving difficulty
- Say NO to lots of corn silage!
- Heifers should not be the dumping ground for foul feed

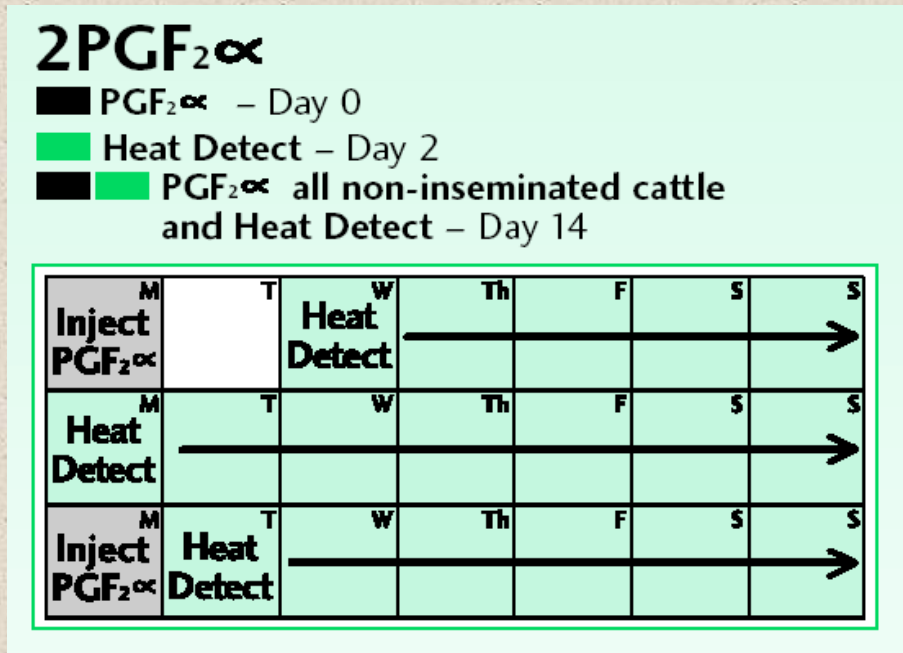
Exogenous Estrogens

- Zearalenone
  - A mycotoxin with estrogen like effect on cattle
  - The only one known to directly cause abortion
  - Causes follicular cysts, irregular cycles, mid-cycle heats, false heats in pregnant animals, premature udder development
- Phytoestrogens
  - Plant estrogens biologically active in cattle
  - Prime candidate is mature first cutting alfalfa hay or haylage growing in cool wet conditions down longer than usual
  - Same signs as zearalenone without abortions

Removal of offending feed source results in a return to normal estrus behavior in one week or so.

"Targeted Breeding"

- Solely designed to shorten and synchronize estrus, not a timed breeding program
- 66% respond 1st shot
- 85% on 2nd
- 90%+ on 3rd
- Originally designed for 11 day intervals



Progesterone Programs

- EZ-Breed CIDR
- MGA – melengesterol acetate
- Suppress cycle, clear off CL's, begin follicular development "from scratch" at the same time
- CR dependent on heat detection and basic heifer fertility

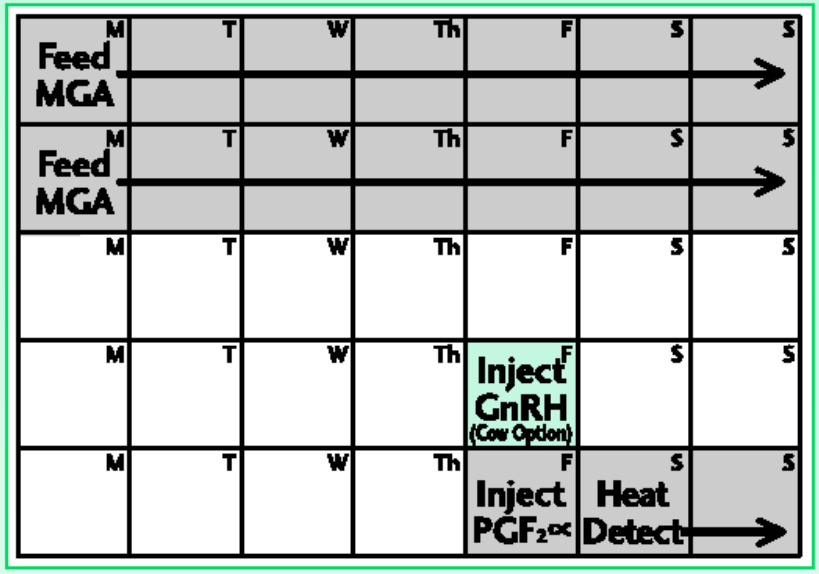
MGA - Melengesterol Acetate

- Cheap! Pennies per day
- One study increased heifer PR 13% from high 40's to low 60's
- Must be able to ID and segregate heifers
- Must feed MGA at prescribed rate (0.5 mg/day/head) for right length of time
- Not many using it

Oral MGA

Heats are less fertile before $PGF_{2\alpha}$.
Only AI after $PGF_{2\alpha}$.

- **Feed Oral MGA** – Start Day 0 until Day 14
- **GnRH** – Day 25
  (Optional for tighter synchronized in cow group)
- **$PGF_{2\alpha}$** – Day 32
- **Heat Detect and AI** – Day 33 and on



Some appointment breed 72 hours post PG

EZ-Breed CIDR's
(Controlled Internal Drug Releasing)

- ~$9.00 each
- Individual approach
- Less facility dependent
- Hormone delivery not dependent on DMI

CIDR

- CIDR Inserted – Day 0
- Inject $PGF_2\alpha$ – Day 6
- CIDR Removed – Day 7
- Heat Detect – Days 8-11

M	T	W	Th	F	S	S
Insert CIDR						Inject $PGF_2\alpha$
M	**T**	**W**	**Th**	**F**	**S**	**S**
Remove CIDR	Heat Detect			→		

What about Ovsynch?

- Extra follicular waves alter response in heifers
- Does not provide the appointment breeding opportunity as in adult cattle
- Relies on conventional heat detection effort

Management Tools

- Visible, documented ID
- Written protocols
- Flexible, accessible record keeping system
- Team approach –vet, herdsman, AI tech

Management Tools

- Convenient areas for restraint and procedures
- Provisions to measure growth
- Appropriate grouping to make rations, breeding, preg checks, vaccinations, etc. work efficiently

Evaluating your program

- When do you start breeding heifers?
- What is your heat detection rate?
- How many services result in pregnancies?
- How many confirmed pregnancies result in a term calf?
- How fast does this all happen?

Don't forget…..

- Routine, timely preg checks are critical to heifer repro just like it is for cows
- Recheck pregnancies by mid term
- Vaccination programs for reproductive health start during calfhood
- No matter what your threshold for heifer breeding is, heat detection must be intensive and relentless in order to keep the age at first calving distribution in a reasonable range


THANK YOU!

Heifer Management Evaluation Snapshot – Two Components

Replacement Generation Capacity (RGC)*

Koval Bros. Case Farm

Longer Term – Factors Affecting Asset Growth (IHG)

Herd Birth Rate

(Freshening events as % avg. cow nos.)
≥108%*
*distorted during Expansion
(108% Koval)

% Heifers Born

(Female births divided by all births)
≥46 – 47%
(55 – 60% sexed semen)
(49% Koval)

% Heifers DOA (≤ 24 hrs.)

(Female births DOA divided by all births)
≤5%
(2.2% Koval)

Annualized Heifer Cull Rate

(Heifers died/culled divided by avg. # heifers)
≤3%*
*distorted during Expansion
24 hrs. → 3 mos. ____
4 mos. → fresh ____
(3% Koval)

Age at First Calving (Months)

(Age and standard deviation)
23 ± 2.5 mos. SD (& 82 – 85% Mature Wt.)
(23 ± 2.5 Koval)

*Adapted from Farm Credit's Business Consultants' *Heifer Management Index*

Questions